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ARTICLES AND NEWS BRIEFS FROM HUA-HSUEH KUNG-YEH CONCERNING CHEMICAL INDUSTRY TECHNOLOGY

- COMMUNIST CHINA -

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ARTICLES AND NEWS BRIEFS FROM HUA-HSUEH KUNG-YEH CONCERNING CHEMICAL INDUSTRY TECHNOLOGY

/ Following are translations of selected articles and news briefs from Hua-hsueh Kung-yeh (Chemical Industry), Peiping, No. 8, 21 April 1960. /

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UTILIZATION OF WASTE PRODUCTS AS INSECTICIDE AND FUNGICIDE

/ Following is a translation of an article in Hua-hsueh Kung-yeh, Peiping, No. 8, 21 April 1960, page 13./

Research has been undertaken by the Soybean Research Division of the China Agricultural Science Institute on the effectiveness of insecticidal and fungicidal power of 20 kinds of industrial chemical waste products. Their determinations showed that the utilization of these waste products constituted a vast latent power in preventing plant diseases and insect control. Nine kinds of waste material, such as liquors from the filtration of fatty acids, waste liquors of p-nitrochlorobenzene-o-sulfonic acid, o-aminoanisole, o-nitroanisole, filtrate from p-nitro-anisole, waste liquors from aniline, No. 4 mixed waste liquor, 2-aminoanthraquinone, p-nitro-sodium phenolate, etc., can be diluted with water in various ratios and applied directly, possessing insecticidal power of 80-100% and fungicidal effectiveness of 90% with no toxicity. The preliminary results obtained by the Soybean Research Division of the China Agricultural Science Institute are therefore valuable.

Results of Determination of Insecticidal and Fungicidal Effectiveness of 13 Kinds of Industrial Waste Materials in Insect Control and Prevention of Plant Diseases

Reference No.	Name of Chemical	Dilution Ratio	Insecticidal Rate %, hispa	Fungicidal Rate %, rice-leaf spot, foot rot; cotton - black arm, anthracnose	Fungicidal Rate %, rice - seedling blight	Fungicidal Rate %, sorghum - kernel smut	Toxicity
1	Fatty acids filtrate	100	100		100		-
		1000	85		80		-
2	p-nitrochloro-benzene-sulfonic acid	50	0	0	100	100	-
		100	85	80	100	100	-
3	o-aminoanisole	100	100	100	0		+++
		500	100	0	100		-

4	o-nitroanisole	200	100	100	100	100	-
		500	0	0	0	0	[illegible]
5	p-nitroanisole	500	95	0	0	0	+++
	filtrate	1000	80	0	0	0	
6	Aniline Waste	5	0	100	0	0	-
	Liquor	50	5	0	0	0	
7	p-nitro-sodium	10	0	100	0	0	++
	phenolate	100	7	80	90	0	--
8	No. 4 mixed waste	50	0	0	0	0	
	liquor	100	0	100	0	0	--
9	2-aminoanthra-	50	0	100	0	0	
	quinone	0	0	0	0	0	
10	Mixed nitroanisole	100	100	0	0	0	+++
		1000	75	0	0	0	+++
11	Calcium nitrate	100	100	0	0	0	+
		1000	70	0			+++
12	p-aminoanisole	100	75	0	100	70	++
		500	4	100	0	0	--
13	Residue contain-	100	0.5	0	0	0	--
	ing benzene	500	1.5	0	0	0	--

NEWS BRIEFS ON TECHNICAL REVOLUTION

[Following are translations of various items compiled by the editor in Hua-hsueh Kung-yeh, Peiping, No. 8, 21 April 1960, page 26.]

Collection and Recovery of Water Condensed from Steam Carried Out by Kirin Industrial Chemical Company's Calcium Carbide Factory

The collection and recovery of water condensed from steam is of great significance in the modern thermo-electric plant. In the interrelated chemical enterprises, high purity water from such sources is demanded. Consequently, the task is a difficult one. However, under the leadership of the factory Party Committee, by fully developing mass cooperation and all having one thought in mind, concentrating all efforts, tackling the problem as if it were "a big campaign," water was recovered and its quality was raised to the approved level within two months. Results achieved were unprecedented.

The actual methods used by the Calcium Carbide Factory of the Kirin Industrial Chemicals were: (1) controlling water recovery engineering work; (2) controlling recovered water quantity; (3) controlling recovered water quality; (4) controlling recovered water quality research. The water transport problem was first met and its quantity was increased by connecting all branches to the mains. In the past few months connections were made with 23 sources for water which originally were drained into sewers. In connection with the recovered water, analytical work, the analytical laboratory of each workshop analyzed the water from its branch line. Besides that, the water-steam analytical laboratory in the factory daily analyzed samples from the main outlets of each and all of its workshops and those from the pumps department. This measure facilitated adoption of appropriate action when the quality varied. Beginning in January, most of their recovered water has been directly piped to the de-oxygenation unit of the thermo-electric plant, thus meeting production needs.

In order to raise the quality of recovered water through numerous tests, they disconnected sources from which the water was beyond treatment. At the same time, all water tanks which could be improved were examined and rebuilt, thus extensively eliminating steam and water leakage. These measures reduced the oil content of treated water to one to four mg./liter, which met the basic requirement in water supply.

Gains Made by Automatic Production

Automation has materialized at the Hunan Agricultural Chemical Factory's lead arsenate department. A whole set of push-buttons have replaced heavy manual chores. The original labor force has been reduced from 12 to three and production has increased four to five times. Aside from saving a large amount of iron tubes, ceramic switches, dam switches, etc., and other instruments, lead poisoning has been prevented. Workers of the Shao Yang Carbon Black Factory's high abrasion carbon black department, through intensified, simultaneous designing, research and action for 24 hours, have also converted production into automation. Production has increased more than two times and an income of over one million yuan has been created for the country.

Remote Control in Ethyl Acetate Production Materialized

Although the Harbin Chemical Industry Workshop is a small outfit, its staff is still highly ambitious. For example, their ethyl acetate workshop was completely manually operated. However, after two months of rebuilding, the transport of raw materials and products has been channelled and processing has been automated. The labor force has been reduced from ten to seven. Recently another story was added on top of this workshop and the entire production process is now under remote control. By operating the various instruments and pushbuttons on the platform, the whole production system can be controlled by only one workman.

Bright Lights, Roaring Machines in Shafts after Facelifting Reconstruction under Technological Revolution Campaign

Miners at the Nan Yu Workshop of the Taiyuan Iron Pyrite Factory intensified shaft revolution and campaigned for mechanization and semi-mechanization. Shafts have been widened and lights installed. Now the shafts are neat, wide, well-ventilated and illuminated. A 30 horsepower air compressor has been installed, and pneumatic drills have been employed. Carts for transportation have replaced human and animal labor. Hammers and pick axes have been basically replaced in mining. The number of dynamite holes drilled has increased rapidly from four to over 100 per eight hours, thus raising efficiency more than 25 times. At the same time, transportation efficiency has also been raised five to six times.

Kaifeng Chemical Factory Strives for Remote Control

Up to 25 March, mechanization and semi-mechanization at the Kaifeng Chemical Factory had reached 80% of the goal to be attained before 1 May, as set forth by the municipal committee. On the basis of this success they strove for even higher goals and enhanced technological revolution. After working for five days and nights the remote control system was adapted in controlling electrolysis trough, voltage and liquor

level in their electrolytic processing section. The labor force per shift has been reduced two-thirds as compared with the number originally planned. Moreover, health hazards of chlorine gas have now been eliminated.

Successes in Attempts to Produce Large Varieties of New Products and Perfecting New Techniques Attributed to Nanking Phosphates Fertilizer Factory

In the course of the technological revolution campaign, Nanking Phosphates Fertilizer Factory has undertaken, on one hand, the mechanizing, automating, and linking of production. On the other hand, they have attempted to produce new products and tested new techniques. Satisfactory results have been obtained in both projects. Up to the end of March they had successfully produced 115 varieties of new products, which is three times the number of new products made last year. Also, 25 items of new techniques equivalent to four times the total number of items last year have been tested and perfected.

Attempts in producing these new products were based on the needs of the country and the utilization of diversified raw materials. Work on new techniques followed the aims in solving key production problems, increasing installation capacity, and raising technical standards. For example, recently they pioneered the use of electricity for defluoridation in this country. Small-scale tests in making phosphates by using cyclone mixer have been basically successful. The new techniques involved in producing high-grade cement by using yellow phosphorus residue from electric furnaces have been perfected. The recovery rate of fluorine will be raised two times. The conversion rate of superphosphate will be raised to 95% from the present 75%. These advances will largely raise the quality and increase the production of superphosphate. High efficiency phosphates such as triple superphosphate, ammophos, sedimentated superphosphate, etc. have been successfully produced on test scale production. These types of phosphate fertilizer have over three times the efficiency of ordinary superphosphate now in production.

Chang Chou Chemical Factory Adopts Bubble Drying Tower in Drying Chlorine Gas

During the technological revolution campaign we have adopted the advanced experiences of the Shanghai T'ien-yuan Chemical Factory in drying chlorine gas. In fitting into our installations and processing patterns, a bubble-drying tower has been built by native methods replacing the original ceramic spraying absorption tower. The advantages of this tower are as follows:

1. Simple equipment which is easy to build. Our tower was built by native methods with used materials and, in addition, 250 kg. of four mm. steel sheet, some high melting asphalt only. It was completed in two days and production began immediately. It has saved the operation of the four original ceramic spraying towers and three anti-acid pumps, and also occupies less than one-fifth of the original area.

2. High efficiency. In adopting this process, the direct contact area between chlorine gas and the cooling water circulating in the opposite direction has been increased, thereby increasing the amount of chlorine gas for treatment to ten tons daily from six to seven tons in the past. The water content has decreased perceptibly from seven ten-thousandths to less than three ten-thousandths (under extremely careful control, the water content of chlorine gas can be kept steadily at two ten-thousandths). Consumption of sulfuric acid has been reduced by two-thirds. Besides saving the use of anti-acid pump operation, control is more convenient and this greatly insures an even production rate.

<u>Reforms in Technology and Processing Methods Reached 67% at Hai-ning Agricultural Chemicals Factory</u>

Big achievements have been made by Hai-ning Agricultural Chemicals Factory during the technological reform and revolution campaign. Mechanization and semi-mechanization reached 85% in their whole production process.

The characteristics of the double revolutionary campaign carried out by this factory were the extensive technological reforms based on key production issues. Among the 1280 reforms which were adopted, 67% concerned production technology and processing methods. For example, the glass rod has been replaced by the metal rod in the Ti-pai-chung type mixer. This proposal was made by spotting the key issue, in this case, that glass is easily breakable. Similarly, to meet the coal supply problem, a "sulfur-burning method" was found in the production of hydrochloric acid and coal was not used.

<u>Other Technological Reform News</u>

1. The copper-ammonia liquor employed by the Nanking Chemical Industries Company for the manufacture of synthetic ammonia used to be prepared from electrolytic copper as raw material in the past. Tests in using copper ores in place of electrolytic copper have now succeeded. The substitution will save 20 tons of electrolytic copper per annum for a 100,000 ton-capacity synthetic ammonia plant.

2. Waste ammonia, a by-product in the production of sulfanilamide, was used by the Tung-pei No. 7 Pharmaceuticals Factory to produce ammonium sulfate. Two hundred tons of this material can be produced annually.

3. Rubber tubing has been used in place of seamless steel pipes in piping natural gas across the Chia-ling River by the Hsi-Chun Pharmaceutical Factory of the Chungking Chemical Industries Bureau. The achievement facilitated the general use of natural gas at this point and also assured an earlier production date.

4. Rubber tubing, rotary pump, a type of non-metal fluid transport tool, has been developed by the Hua-ching Pharmaceutical Factory of Tientsin. This type of pump utilizes the rotary action of gears in compressing the rubber tubing, thus transporting the fluid. It has a

capacity of five to six m^3./hour and the outlet pressure is above three kg./cm^2. (equivalent to a lifting range of over 30.m.) A 0.6 kw. motor is required for its operation, and the tubing does not need to be filled with fluid at the start of the operation.

5. In the production of benzanthrone at the No. 1 Indanthrene Workshop of the Kirin Dyestuffs Factory, condensation was carried out with the starting materials, thus saving four steps, i.e. dehydrating, desalting, filtration, drying, etc. At the same time, production capacity has been raised four and a half times over that of the originally designed by employing high-efficiency catalysts, raising steam pressure, and changing reaction temperature.

ON USING NON-METALLIC EQUIPMENT

/Following is the translation of various items compiled by the editor in Hua-hsueh Kung-yeh, Peiping, No. 8, 21 April 1960, page 34/

An All-Glass Processing Unit Built at Shanghai No. 2 Pharmaceutical Factory

An all-glass equipped processing unit for making Vitamin A has been built at the Shanghai No. 2 Pharmaceutical Factory recently. Glass apparatus, tubings, and other glass equipment totalling over 2,000, i.e. reaction vessel, evaporator, elevated trough, centrifugal pump, were built.

It is known that in the course of Vitamin A production the reaction temperature varies greatly and is carried out under certain pressure. However, under the progressive aid of the Shanghai Glassware Factory, and through our joint research efforts, the problems of materials, structure, and production were solved and an all-glass equipped processing unit suitable for producing Vitamin A was successfully assembled.

The completion of this all-glass unit not only saved 15 tons of steel building materials (including one ton of stainless steel), but also facilitated the production of Vitamin A at an earlier date. The product obtained contains 10,300 I.U. per gram.

A Non-Metallic Automatic Flow Line Constructed at the Shanghai Synthetic Resin Factory

Under the direction of the Party and with the self-providing spirit of the workers and technicians at the Shanghai Synthetic Resin Factory, trimethylamine has been produced by using native methods and non-metallic equipment.

As described in the literature, production of trimethylamine is generally carried out under high pressure, thus involving the need for autoclave and equipment for fractional distillation under pressure. It is calculated that 30 tons of steel building materials are required to build a plant with a daily capacity of one ton. The Shanghai Synthetic Resin Factory, through various tests, finally adopted a new method in which ceramic vessels and plastic materials are substituted for metals, and glass tubing replaces iron tubes. Addition of raw materials and

withdrawing of products are channelled, reaction temperature is automatically controlled, thus resulting in a non-metallic flow line in producing ion exchange resins.

This set of non-metallic equipment built by native methods affords simple and convenient manipulation and saves labor. At the present, this section is controlled by only one workman. The quality of trimethylamine produced meets the requirements, thus assuring mass production of ion exchange resins.

T'ien-yuan Type 60 High Pressure Anti-Acid Ceramic Pump Developed

A high-pressure anti-acid pump, the T'ien-yuan Type 60 designed by T'ien-yuan Chemical Works, has been successfully developed. Operation tests proved to be satisfactory. R.P.M. 3,000/minute; lifting range, 45 m. (water column); lifting capacity, 400 lit./sec. Its efficiency is nearly three times more than single stage centrifugal pumps. Many advantages are attributed to its construction: sealed type of casing prevents shattering of blades; its anti-acid property is higher than that of stainless steel; its cost is one-third of those made with stainless steel.

USING LOW-QUALITY ORES IN PRODUCTION OF CONTACT SULFUR

[Following is a translation of an article in Hua-hsueh Kung-yeh, No. 8, 21 April 1960, pages 40-41.]

Editor's Note: Using low sulfur content, low-quality ores, and powder ores in the small-scale contact process has much significance in the further realization of the power of that process. The abundance of large area small-scale sulfur production demands widespread sources of raw material as its strong guarantee. Therefore, simultaneous with the improvement of production and increase of output, the active research in the utilization of low-quality ores and powder ores is very important. Our goal should be from high production to higher production with the widespread utilization of local low-quality ores and powder ores to reduce the transportation of raw material and lower the cost of production. Although the two papers presented here are not very advanced from the viewpoint of daily production level (1.5 to two tons at present), their preliminary experiences have proved that it is possible to use low-quality and powder ores in the contact process. Hence we present them here for your information.

How to Use Powder Ores in Contact Sulfur Production
by the Kiangsu Hsin-hai-lien Chemical Industry Bureau

In the contact sulfur production of the Red Flag Chemical Factory in our city, the substitution of block ores by powder ores has succeeded to a definite extent. According to the preliminary conclusions of that factory, the main experiences are as follows.

1. Make balls with powder ores. The balls must be tight, dry, and unbreakable from a fall of 1.5m or endure 50 to 60 kg. of pressure. Water content should be 0.8% to 1%. Thus, burned under ordinary burner temperature, they are easy to burn and hard to break, and retain ball shape after burning.

The diameter of the ball is about 30mm. The finer the powder the tighter it should be pressed. If some coarse particles are mixed with the finer ones, they should go through a sieve of 40 sieve eyes. The humidity also affects the tightness of the ball. In making balls about 5% of the water should be added to the powder so that they will stick together when molded by hand. Too little water will result in a lack of viscosity, and too much water will result in easy breaking when dry.

After the balls are formed it is necessary to dry them to 1% water

content. The methods used by that factory are sunshine and baking. In baking, the heating should be gentle and slow so that the surface and center can attain the same degree of dryness without damage to the surface. The temperature of the baking room in the factory is kept at 100 to 120°C.

2. Observe the principle of "gentle stirring, gentle turning, and even loading" in manipulation to adapt to the peculiarity of the burning of ore balls. Even after complete burning the balls should still be kept in good shape to prevent the accumulation of powder and keep the burning normal. Gentle stirring is to pry and stir gently before loading; gentle turning is to turn the burner bar gently, especially when the temperature is irregular, the material layer under 40mm., gentle turning is very important; even loading is to distribute the raw material evenly in the burning chamber. If block ores are also used at the same time, they should be put in first to hold the ore balls and keep more interstices.

In using powder ores, whether it is necessary to use block ores at the same time and how much should be used all depends on the sulfur content of the raw material and the breakage of the ore balls during burning. When the condition of equipment corresponds with designed condition, the temperature of manipulation is normal, and the sulfur content is relatively high in the ores, the ratio that the factory used is Powder:Block - 3-5:1. Besides, in using powder ores, it is necessary to strengthen the dust removal operation in order to avoid further blockage of catalysts.

How We Use Low-Quality Ores in Contact Process

by T'ang K'o-hui of the Anhwei Fu-yang Chemical Factory

The 400-ton local contact sulfur production was originally designed to use block ores of above 30% sulfur content as raw material. However, all the ores that come to our factory from the mine which is facing the mountain are common ores (that is, powder ores mixed with block ores, with a sulfur content of 11% to 15%). After many hard trials, we have accumulated the following experiences.

1. The combustion of low-quality ores. Due to the low sulfur content of the low-quality ores, they are hard to burn and the burning periods are short. Based on this peculiarity, in the beginning of the process white coal or coke should be used to raise the temperature of the burner until the temperature is high enough and the burning is complete; then the ore is put in. To facilitate the burning, the size of the ore should be smaller than 25mm. The loading of ore should be controlled according to the principles of three less, one more, and two often (less for incomplete burning, less for back smoke, less for low conversion rate, more for normal working conditions, often in loading and often in removal of ashes). In ventilation, the principles of two open and one closed (open for high SO_2 concentration in the burner and burning imperfect, open for blue flame after loading, and closed for low gas concentration and red flame) should be observed in order to assure a better burning for the raw material inside the burner.

2. How rapid loading is achieved. There are some close relationships between the speed of loading and the concentration of gas and the temperature of the burner. If loading is slow, a huge amount of cold air will rush into the burner and reduce the concentration of SO_2 and lower the temperature. Our factory uses the method of "cross cooperation, cycle manipulation" which keeps the loading time to about one minute. The details are as follows: (1) Complete readiness (all ore containers are well filled, all instruments in convenient places so that whenever ores are needed they are always handy); (2) Close cooperation of two burner operators. When Worker A opens the door, Worker B dumps in the ore. When B is dumping the ore, A picks up a filled container. As soon as B finishes dumping, A starts his loading. At the same time B picks up a shovel and as soon as A finishes loading, B smoothes the ore. When B draws the shovel out from the burner, A is ready to close the door. This method efficiently increases the loading speed and helps the burning.

3. How to treat the phenomena of clots at the bottom of the burner. The clots at the bottom of the burner can affect the burning very much and should be removed. But if the treatment is improper, it could also affect the burning. A relatively good treatment is as follows: always open the air door at a definite time, keep the temperature constant, stir the ore in the burner often with an iron bar. Turn the burner bars each time before loading. Turn more if the ore layer is thick and back smoke is frequent. Turn less if the ore layer is thin and temperature is hard to keep constant. The idea is to avoid a clot at the bottom of the burner. After the clot is formed, it would be necessary to remove completely or partially according to the condition. When the temperature is high and the clot is small, the whole thing may be removed. When the clot is larger but the temperature is extremely high, the whole thing may also be removed. But when the temperature is low and the clot is large, it would be necessary to add some more ore and gradually remove the clot so that the temperature would not drop abruptly and affect production.

EXPERIENCE AND DIRECTION OF IMPROVEMENT IN CONTACT SULFUR PRODUCTION

[Following is the translation of an article by the Chung-nan Branch Research Academy of Chemical Industry Planning Team in Hua-hsueh Kung-yeh, No. 8, 21 April 1960, pages 42-44.]

According to the reports on the contact sulfur process from various places, the main experiences are as follows:

1. The pressure and the amount of air drawn by the blower is very influential to production. Air should be drawn at the rate of 500 to 600 cubic meters per hour.

It is obvious that the gas entering the converter should contain about 7% SO_2. However, the SO_2 content of the gas coming out of the burner sometimes does not reach 7%. Instead, it is in the neighborhood of 6%. If the annual production of 100% H_2SO_4 is 1,000 tons, that is 3,000 kg. per day or 125 kg. per hour, assuming that the rate of sulfur combustion is 86%, the rate of conversion is 90%, the rate of absorption 95%, the appropriate amounts of air drawn, from calculations, are shown in Table 1 below.

Concentration of SO_2, %	Air per hr., m^3STP (Volume)	Air per hr., m^3 (40 C) (Volume)
7.5	448	514
7	481	551
6	561	643

From this, one can see that the volume of air drawn by the blower should be 500 to 600m^3 per hour. Too large a volume is unnecessary. As for air pressure, the idea is to overcome the resistance of the system in order to draw SO_2 from the burner. Therefore, it is suggested that the blower with a larger negative pressure should be used. Smaller pressure (150 mm. water gauge) works only at the beginning period, and as the resistance of the converter builds up, it fails completely and the catalysts have to be plowed or sifted. If a blower with larger negative pressure is used, the time for plowing the catalysts can be reduced and normal operation prolonged. According to reports from many places, a pressure of 350 mm. on the water gauge is appropriate. If a blower with higher pressure is available, e.g. Yeats No. 3, it would be better still.

Some units always encounter the difficulties of a high ore consumption and low acid production. In most cases it is due to the insufficient volume of air drawn, or insufficient pressure, a resistance of the whole system,

gases which are produced by the burner cannot be drawn over; consequently, the amount of SO_2 entering the converter is small and the production of acid becomes low.

2. The structure of the burner and the burning surface of the chambers are of vital importance. As to the effects of the number of chambers, experiences differ. Both four and six are acceptable, and have proved to have definite success. Generally speaking, the four-chamber burner is more popular. The large number of chambers proved to be favorable in the stability of the SO_2 concentration. The most important feature of a burner is to have a sufficient burning surface, in general, above three to four m^2. If the burning surface is small, in other words, if the burning intensity is high, the combustion will not be complete, the residue will have a high sulfur content, and the waste will be high. To assure a high percentage production, a sufficient burning surface is indispensable. To facilitate manipulation, a shorter chamber is preferred, in general, a width of 1,000 and length of 800 is appropriate.

3. The SO_2 content and the temperature of the gas entering the converter have a decisive effect in the production of contact sulfur. The concentration of SO_2 has a great effect on the resistance of the system and the consumption of electricity. When the yield is constant, and if a gas of higher SO_2 concentration is used, the gas passing through the system will be less, the flow velocity of the gas will be smaller, the resistance of the system will be less, and the energy expense will consequently be reduced.

On the contrary, treating gases with a low SO_2 content would not be economical. Ordinarily the SO_2 content is about seven to 7.5%. Although it is possible to obtain gas of higher SO_2 content in the burning process, in order to avoid the vanadium catalyst losing its activity at a temperature above 600° C., it is profitable to adjust the concentration of the SO_2 to seven per cent in the process of conversion. Because the starting contact temperature of vanadium catalyst is 430 to 440° C., whereas for each 1% increase of conversion rate, the temperature rises 2° C. for gas of 7% concentration, 2.4° C. for gas of 8% concentration, and 2.7° C. for that of 9%. Thus, when operating with gas of a higher concentration, the danger of losing activity of the catalyst due to overheating is great.

On the other hand, when the content of SO_2 in the gas increases, the content of O_2 will decrease. The rate of balanced conversion is related to the oxygen content of the gas. Under the same temperature, if the oxygen content is lower, the rate of SO_2 balanced production would be lower. In general, when gas enters the converter, the ratio of the volume of O_2 to that of SO_2 is about 1:5.

Besides, the temperature of the gas entering the converter cannot be lower than 430 to 440° C. At temperatures below this, the vanadium catalyst gives no reaction; at temperatures further below, V_2O_5 reacts with SO_2, forms tetravalence vanadium, that is $VOSO_4$, and the activity of the catalyst decreases conspicuously.

4. One flowing and two non-leakages (pipelines flowing, no gas leaks and no acid leaks) are necessary for normal production. Due to in-

sufficient rigidity of the small plant contact sulfur system, leaking of gas to form short circuits affecting normal production is quite common. Therefore, frequent inspection and repair are recommended.

5. Four rapidities and five stabilities in operation are important. The four rapidities are rapid loading of ore, rapid removement of residue, rapid manipulation of burners, and rapid sifting of catalysts. The five stabilities are stable concentrations, stable conversion rate, stable absorbing temperature, stable system pressure, and stable circulating acid concentration. The four rapidities are necessary conditions for the five stabilities.

Reformation and revolution of techniques should be fermented, starting from the simplification of flow design, the economization of equipment, and the substitution of materials. Following are a few suggestions which require the efforts of all of us.

1. The problem of removing the acid pump. The fifth system of the Wu-hu Union Chemical Plant, which has adopted the non-acid spraying process, has proved that not only is the production normal but also that the concentration of acid is between 90 and 98%. The change of equipment is not much, the acid pump and the circulating pipelines are removed and a stabilizer is added in front of the blower. Also, the filling of the tower is made finer so that the towers can completely condense and absorb the acid.

Some closed-mind people cannot believe that it is possible to remove the acid pump. In fact, it is also reasonable in theory. The basic principles of this method are in agreement with those of the wet contact process plant.

The formation of sulfuric acid following the oxidation of SO_2 to SO_3 is the combination of SO_3 with water. Ordinarily, it is to spray the gas with acid so that the water in the acid will combine with the SO_3 in the gas, thus the concentration of the acid is increased. In the non-acid spraying method, SO_3 containing gas is sent into the cooler with water vapor, mixed thoroughly, and cooled gradually. When it is cooled slowly enough, the acid formed from the combination of SO_3 and water vapor will condense. The concentration of the acid is determined by the temperature of the gas and the condensation temperature. Therefore, it is essential for this method to balance with the quantity of water.

In the small plant contact process, water comes from two sources: 1. the water carried into the system by the ore which is not dry enough; 2. the water carried into the system by the moist air. Under ordinary conditions it is necessary to supply some more water. The amount of water to be supplied depends on the condition of the weather and the composition of the ore. Following is a sample of calculation for the reference of those units which may be interested.

1. Production: 125 kg. per hour; that is, 3,000 kg. per day 100% H_2SO_4.
2. Ore Composition: 30% S (dry base), 5% H_2O
3. Residue Sulfur Content: 4% to 5% (use 5% in calculation)
4. Production of Residue: $\frac{160-30}{160-5} = 0.839$ ton per ton of ore

5. Rate of Sulfur Combustion: $\frac{1 \times 0.3 - 0.839 \times 0.05}{1 \times 0.3} \times 100 = 86\%$

6. Rate of Conversion: around 90%
7. Rate of Absorption: around 95%
8. Consumption of Dry Iron Sulfide Ore:
$\frac{125}{98} \times 32 \times \frac{100 \times 100 \times 100}{86 \times 90 \times 95} \times \frac{100}{30} = 185$ kg. per hour
9. Water carried in by the ore: $185 \times \frac{5}{100 \times 5} = 9.75$ kg./hour
10. SO_2 Content of the Gas in the Burner: (the SO_3 content is neglected here due to lack of information)
$\frac{185 \times 0.3}{32} = 1.735$ kg. molecule/hr. or $89.9 m^3$ STP/hr.
11. If the SO_2 content of the gas in the burner is 7%, the concentration of O_2 would then be $21 \left[1.375 - \frac{21(1.375-1)}{100} \right] 7 =$
$21 - 9.06 = 11.94\%$
12. Other components of the gas in the burner:
Total gas $= \frac{1.735}{7} \times 100 = 24.8$ kg.-molecule/hour or
$24.8 \times 22.4 = 555 m^3$ STP/hour
$O_2 = 555 \times 11.94\% = 65.3 m^3$ STP/hour
$N_2 = 555 - (38.9 + 65.3) = 430.8 m^3$ STP/hour
13. The amount of dry air entering the burner:
$\frac{430.8}{0.79} = 546 m^3$ STP/hour
14. The amount of water carried in by the moist air; assume that air temperature is 30 C., relative humidity is 80%, the water carried in by each kilogram of air would be 0.022kg.
$\frac{546}{22.4} \times 29 \times 0.022 = 15.55$ kg./hour
15. The amount of water enters the system:
$9.75 - 15.55 = 25.3$ kg./hour
16. The amount of water to be added for acids equivalent to 125 kg. 100% H_2SO_4 are: (1) Production of acid at different concentrations:

90% H_2SO_4	139 kg./hr.
93% H_2SO_4	134.5 kg./hr.
95% H_2SO_4	131.5 kg./hr.
98% H_2SO_4	127.5 kg./hr.

(2) Amount of water needed: using 98% H_2SO_4 as an example, this contains 80% SO_3, so the amount of water would be $1 - 0.8 = 0.2$, $127.5 \times 0.2 = 25.5$ kg./hr. Hence, only need supply $25.5 - 25.3 = 0.2$ kg./hr. The amount of water needed for different concentrations of acids are shown in Table 2.

Table 2.

Yield of Acid (kg./hr.)	Water Needed (kg./hr.)	Water to be Supplied (kg./hr.)
90% H_2SO_4 139	36.85	11.55
93% H_2SO_4 134.5	32.4	8.9
95% H_2SO_4 131.5	29.6	4.3
98% H_2SO_4 127.5	25.5	0.2

II. The problem of constructing converters with brick to save steel. Using bricks as a substitute for steel not only saves steel but, due to the availability of the material, also saves transportation and speeds up construction. The point is, will there be any leakage of gas when bricks are used as a substitute for steel? Judging from the experiences of the Shan-tung Paint Factory and Shanghai's Ch'i-yi Commune, we think that it depends on the quality of the brick construction work. If the interstices are less than 2 mm. wide, and filled with acid-proof cement, it is possible to avoid leakage. Another problem is leakage due to the cracks caused by heat. If the interior of the converter is constructed with heat resistant bricks, this phenomenon can be avoided, but the efforts of all units are required.

III. The problem of combining the operations of absorption and cooling of SO_3. In ordinary operations, the cooling of SO_3 proceeds in the gas phase and absorption proceeds in the acid-spraying tower. From the observations of the purification of tower sulfur bubbles and the conditions in the production tower, it is expected that the cooling of SO_3 can proceed together with the absorption in highly efficient equipment, e.g. the bubble tower. Thus, both the heat of the SO_3 itself and the heat generated on absorption can be carried away by the spraying acid. In other words, the acid cooler can substitute for the SO_3 cooler. If the pressure of the blower is high, using the spray bubble tower as an absorption tower would be profitable, since the equipment would be reduced, construction simplified, efficiency raised, investment reduced. It is indeed one of the revolutions of the contact sulfur technique.

IV. The problem of the automation of catalyst sifting. Although many steps have been taken in production operations, all of us are very cautious in handling and saving catalysts. The work of catalyst sifting has not yet been eliminated. To save labor we are now facing the problem of automation of catalyst sifting. This reformation, we judge, can proceed in two directions. The main direction is toward the automation of the sifting operation; the other direction is that we desire some improvements on the catalyst production part about the mechanical strength and wear resistance.

V. The consideration of how to make the loading of ore, and removing of residue, an automatic or semi-automatic operation. We judge, besides the reformation in manipulations, the improvement of the construction of the burner is more important.

VI. Revolutions have started on the original basis of the flow

design of the contact process, but are they completed? We judge that there are some more complete reforms to make, starting from "three points and one line." That is burner--conversion--acid production. Even burning and conversion can be combined in one installation, and the SO_3 coming out of it is ready to form acid. All improvements in operations should be directed toward complete automation and mechanization in order to save as much labor as possible.

VII. Concerning the combined utilization of residue. The main component of residue is ferric oxide. Besides being used as the raw material of iron salt, of more importance is the improvement of the construction of the burner so that iron can be produced simultaneously with SO_2, thus killing two birds with one stone.

VIII. Expanding the use of resources. The iron sulfide mines discovered in our country are not very abundant. We have more mines of lower sulfur content and we have some low quality ore, some sulfur by-products of the color metal mines, enormous sources of gypsum, and some hydrogen sulfide-containing gases from coke manufacturing. Therefore, how to make use of these resources in the contact process would be the direction of our future research. On the basis of making use of more sources of raw materials, the future development of contact sulfur would be more brilliant. Let us, the comrades of the sulfuric acid front, offer more of our energy to the great revolution of contact sulfur techniques to help the contact sulfur production achieve a higher level.

SEVERAL TYPES OF AUTOMATIC ANALYZERS WHICH WE HAVE BUILT

[Following is the translation of an article by Wu Chun-chou, T'ai-yuan Chemical Works, in Hua-hsueh Kung-yeh, Peiping, No. 8, 21 April 1960, pp. 45-47.]

While in the process of developing automated production in our plant, the following instruments have been successfully built on a test scale. These are: automatic universal gas analyzer, automatic universal liquid concentration analyzer, automatic polarograph, and automatic titrator. They have been already used in production and have saved time and labor greatly in analytical work. Moreover, they exert a great influence in our work for complete automation in production.

1. Automatic Universal Gas Analyzer

This instrument can be used for the analysis of sulfur dioxide, sulfur trioxide, oxygen, carbon monoxide, carbon dioxide, chlorine, hydrogen chloride, and unsaturated hydrocarbons. In the analysis of different gases only the absorbent in the absorption flask needs to be changed.

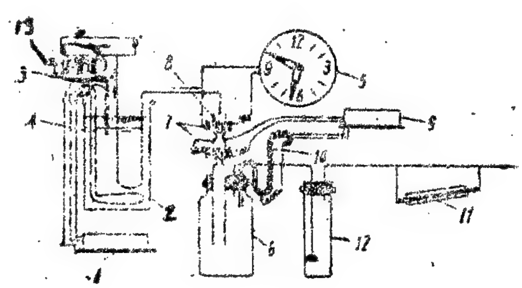

Figure 1.

1. circuit connector; 2. water bath; 3. thermometer; 4. heating element; 5. electric clock; 6. pressure stabilizing flask; 7. magnet; 8. automatic regulating iron valve; 9. circuit connector; 10. low pressure manometer; 11. small manometer; 12. absorption flask; 13. gas inlet tube.

Figure 1 is a simple diagram showing the assembly and circuit

of the automatic universal gas analyzer. Gas enters through the inlet tube, passes the constant temperature water bath (2), and the automatic regulating iron valve (8), then it is led into the pressure stabilizing flask (6), and finally the absorption flask (12). Any unabsorbed gas passes on to the low pressure manometer and the pressure shown thereon indicates the purity of the gas being determined. This instrument has the following automatic characteristics.

1. Timed automatic electric switch. The timing attachment is converted from an electric clock, i.e. the long hand of the clock is connected to current, and contact points are installed on the surface of the clock at whatever time needed, such as 10, 20, 30, etc. A circular magnet is connected in series between the long hand and the contact points. A glass tube encasing an iron rod is inserted in the magnetic field. When the long hand touches the contact point, the circuit is connected and the iron rod is attracted by the magnetic force to the upper portion of the glass tube. At this moment the gas to be determined passes into the analyzing setup. When the long hand passes two to five minutes (determination period) and contact is broken with the contact point, then current is shut off. Simultaneously, not being attracted by the magnet, the iron rod falls down and blocks the gas inlet. The iron rod in the glass tube thus assumes the function of a timed automatic electric switch.

2. Automatic signal. An electric buzzer connected to the circuit of the automatic switch serves as an automatic signal. When the circuit is connected by its buzzing we can read the result of the analysis.

3. Automatic constant temperature regulator. As the pressure and volume of the gas to be determined varies at different temperatures, the results obtained are also different. In the past, results were corrected for the temperature differences and such corrections involved comparatively complicated calculations. However, the temperature can now be kept constant with this regulator which consists of a circuit connector, a heating element, and a thermometer.

4. Automatic constant pressure regulator. Gas pressure fluctuates greatly in plant systems. Therefore, its pressure should be stabilized prior to its entry into the analyzing instrument. The automatic constant pressure regulator is composed of a circuit connector, a U-shaped manometer, a gas stabilizing flask, and a magnet. The controlling circuit is formed by inserting one end of the circuit connector into one of the arms of the U-tube. When the gas pressure in the pressure stabilizing flask increases, the mercury column rises and comes into contact with the end of the circuit connector whereby the current is broken. The falling of the iron rod from the magnetic field blocks the gas inlet. When the pressure in the stabilizing flask decreases, the circuit is connected through the circuit connector. The iron rod is attracted by the magnet and gas entering the stabilizing flask is continued. The pressure of the gas entering the absorption flask is thus kept constant by alternately opening and closing of the gas inlet.

5. Low pressure manometer. After the gas to be analyzed passes through the absorption flask, the remaining gas enters the manometer. This instrument is always adjusted before operation begins. The magnitude of the pressure shown by this instrument determines the percentage content of the gas being analyzed.

2. Automatic Universal Liquid Concentration Analyzer

This instrument can be used to determine the concentration of liquid caustic soda, sulfuric acid, brine, and hydrochloric acid, etc.

Its components are a stabilizing flask, a standard specific gravity flask, a hydrometer, a balance beam, and an electric buzzer.

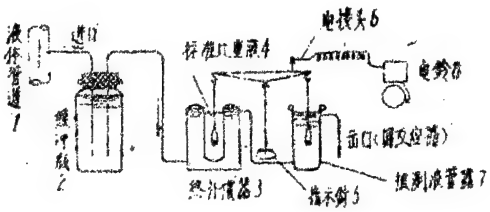

Figure 2.

The liquid to be determined passes from tube (1) into the valve (controls a regular flow rate), into the stabilizing flask (2), and then into the heat compensator. A small graduated cylinder filled with a liquid of known concentration is placed in the heat compensator. A hydrometer is suspended in the cylinder by attaching it to one arm of the balance beam. The liquid flows out from the upper part of the heat compensator into the receptor (7). Similarly, an identical hydrometer is suspended in the liquid receptor (7), with its end attached to the other arm of the balance beam. A contact point is installed on this arm and is connected with the buzzer (8). When the concentration of the liquid to be determined is lower than that of the standard, the difference in specific gravity causes the pointer to swing to the right and the contact point on the right arm of the beam loses its contact point with the leading wire of the buzzer; however, if the specific gravity equals that of the standard, the pointer will rest at zero, the contact point on the right arm of the balance beam touches the leading wire and sets off the buzzer. Thus, buzzing indicates that the liquid under determination has reached standard concentration. This instrument makes the processing in evaporating electrolytic caustic liquor and absorption of sulfuric acid very convenient.

3. Automatic Polarograph

Quantitative analysis can be carried out with almost any metal or reducible and oxidizable organic compound by the use of the polaro-

graph. However, its operation was all manually controlled in the past. Now we have equipped it with some automatic controlling devices. These are an off-and-on switch, a temperature regulator, a stirrer, a hydrogen gas regulator, a signal device, a flashing device, etc. Figure 3 shows the circuit of the automatic devices attached to the polarograph. Details of the polarograph components are not shown.

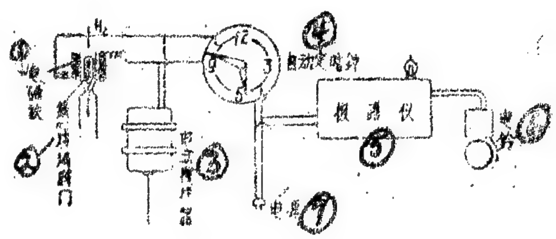

Figure 3.
1. Magnet; 2. glass encased iron rod valve; 3. automatic stirrer; 4. automatic timer; 5. polarograph; 6. buzzer; 7. current source.

The glass encased iron rod valve is used as an automatic regulator of hydrogen gas. When the circuit is connected, the iron rod, by the action of the magnet, is attracted to the upper part of the glass casing, allowing hydrogen to pass through. When the circuit is broken the iron rod, being not attracted to the magnet, falls and blocks the passage of hydrogen automatically. The stirrer is used chiefly to control the electrolysis temperature. The automatic timer enables the instrument to operate every 15 minutes. The current supply in the whole system is controlled by one source. Thus, operation of all the devices can be either started or stopped all at once.

4. Automatic Titrator

The automatic titrator is applicable in all acid-base and oxidation-reduction titrations. It is also applicable in titrations in which solutions exhibit a color change either before or after the predetermined end point.

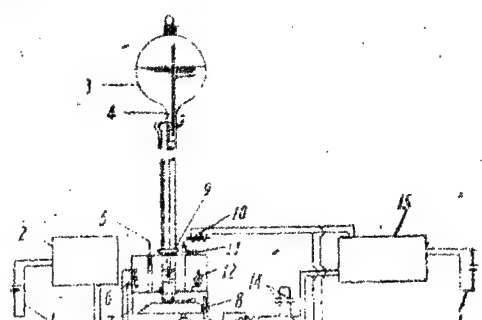

Figure 4

1. Current source (220 v.); 2. voltage regulator; 3. standard solution; 4. automatic burette; 5. photoelectric cell cover; 6. photoelectric cell; 7. sample beaker; 8. magnet stirrer; 9. three-way stopcock; 10. circuit connector; 11. spring; 12. light source; 13. variable resister; 14. capacitor; 15. electronic automatic regulator.

The automatic titrator is composed of a burette, a voltage regulator, a photoelectric cell, a magnet stirrer, a circuit connector, a variable resistor, a capacitor, and an electronic automatic regulator. Its characteristics are a constant dropping rate, an automatic stirring, and the control of end-point by photoelectric colorimetric determination.

In starting the analysis, the regulator (15) and voltage regulator (2) are first connected with the current source. The standard solution (solution already titrated and reached end-point) is placed on the magnet stirrer platform, light(12) is switched on, photoelectric cell cover is removed, and current is thus developed. The developed current is shown by the automatic regulator and its magnitude is set by the red indicating needle.

After the work of the above stage is completed, the standard solution is replaced by the solution to be determined. Since the concentration of these two solutions are different, the current developed by the latter is smaller than that developed at the end-point. Hence, when the regulator (15) is switched on, the stopcock in the burette (4) is opened by the circuit connector, and automatic titration commences with the stirrer also set in motion. When the titration gradually approaches the end-point, the current developed also increases. When the end-point is finally reached, the circuit connector (10) automatically breaks the circuit, the burette stopcock by the action of the spring also automatically turns off, stirring also stops automatically, and the titration is completed.

Our preliminary attempt in automating analytical work has been successful. However, we shall continue our efforts to improve these instruments and build even more automatic analytical instruments in the technological revolution in the future.

REPLACING COKE WITH POWDERED ANTHRACITE IN THE PRODUCTION OF CALCIUM CARBIDE

[Following is the translation of an article by the Canton Chemical Industry Bureau in Hua-hsueh Kung-yeh, Peiping, No. 8, 21 April 1960, pages 47-48.]

Through their continuous efforts in research, the Canton Chemical Factory and the Chia-pang Factory of this city have found that the readily available powdered Hung Ch'i and Fu Kuo anthracite can be used to replace coke as a starting material in the production of calcium carbide and the results obtained are excellent. A discussion of the main points of their experiences is stated below.

1. Comparisons of the Specifications of Few Carbon-Containing Raw Materials

Table 1.

	Fixed C %	Water %	Ash %	Volatile Matter %	Size mm.
Powdered Hung Ch'i anthracite	87.71	0.58	5.8	5.91	3 - 15
Powdered Fu Kuo anthracite	66.7	5.2	22.67	6.83	0.1 - 20
Coke	>90	<1	<5	<1	20 - 40

It is generally known that in the production of calcium carbide, superior starting materials always have a high fixed carbon content and are low in ash. However, Table 1 shows that powdered anthracite has a low fixed carbon content, is high in ash, and volatile matter content, small in particle size, and the water content is sometimes higher than 5%. Hence, the processing and formulation of the starting materials should be adjusted accordingly in order to maintain the quality of the product.

2. Comparison of Formulations in Using Different Carbon-Containing Starting Materials

A comparison of the average amount of different carbon-containing starting materials in formulating with lime is shown in Table 2.

Table 2.

Lime	Coke	Coal Lump	Powdered Coal
100		50 - 58	
100			60 - 68
100	50		

The composition of lime is as follows: silicon dioxide 0.29%, heavy metal oxides 0.80%, calcium carbonate 94.36 to 97.55%, magnesium carbonate 1.22 to 4.33%, phosphorus, less than 0.0005%, sulfur less than 0.05%.

3. Comparison of Processing Methods in Using Different Carbon-Containing Starting Materials

Processing Method When Coke Is Used

1. Lumps of coke and lime are pre-mixed according to proper ratio.
2. Feeding is carried out either mechanically or manually.
3. The fed materials are evenly distributed.
4. The electrodes should be embedded not more than 300 mm.
5. The charge is generally not disturbed. However, spots which are highly incandescent should be covered with the charge.
6. Batch feeding is adopted.
7. Additional coke is not fed during the course of production.

Processing Method When Powdered Coal Is Used

1. Mixing is carried out while feeding commences.
2. Feeding is carried out either mechanically or manually.
3. The fed materials are evenly distributed.
4. Electrodes should be embedded at a depth of 500 mm.
5. Charge poked at regular intervals after feeding (e.g. each time after withdrawal of the product or every half hour or thereabouts). Holes are made with poker on the surface of charge to facilitate the escape of gas formed.
6. Sufficient charge is added all at once to avoid frequent disturbances.
7. Powdered coal is added occasionally as the fine powder tends to be drawn off by hot air currents thus incurring excessive losses.

Reasons for Modifications

1. The high water content of powdered coal easily causes the flaking of lime, resulting in furnace blocking.
4. Since the electric conductivity of coke is higher than that of powdered coal, it is therefore necessary to increase the area of electric conductivity.
5. As carbon monoxide forms along with the product, good drafting should be maintained in order to insure complete reaction. The fine particle

size of the powdered coal is particularly liable to block all holes on the charge surface.

6. Since the electric conductivity of coke is high, an excessive charge consumes an overly high amount of electricity while powdered coal has a lower rate of conductivity so that a thicker layer is permissible. At the same time, the fine particle size of the powdered coal causes it to be easily blown off so frequent disturbance is avoided.
7. The formulating ratio between lime and coal should remain constant in order to maintain a steady production rate.

4. Product Quality and Fixed Consumption Amounts of Starting Materials

The maximum amount of gaseous matter generated by calcium carbide produced by using powdered anthracite is 240 to 280 lit./kg. and the average minimum is about 190 lit./kg. The fixed consumption amounts for producing each ton of calcium carbide are: lime, lumps 870 kg., powdered Fu Kuo anthracite, 480 kg., electrode paste, 33 kg., average unit power consumption, 3000 to 3200 kw. (2700 to 2800 kw. minimum). The high average power consumption is due to either power failure or malfunctions developed in the processing, thus curtailing furnace operation.

5. Conclusion

It is shown by actual experience that powdered anthracite can replace coke or lump anthracite in the production of calcium carbide. Based on the average amount of gas generated, our product is satisfactory in industrial applications. The unit power consumption is not exceedingly increased by using powdered anthracite. By avoiding caking in the furnace, rotating the grating constantly, and facilitating the escape of gaseous matters, the output can be raised. Charcoal admixed in the product is greatly reduced since the fine particles of powdered anthracite increase the rate of reaction. On the emphasis of maintaining similar quality the cost of product in using powdered anthracite is only half of that obtained by using charcoal according to our calculations.

Loss of powdered anthracite in production is appreciable since the fineness of its particle size makes it easily drawn and blown off by the draft. (Good ventilation is imperative in order to keep the working area tidy.)

NEWS OF CHEMICAL INDUSTRY TECHNOLOGY

/ Following is the translation of various items compiled by the editor in Hua-hsueh Kung-yeh, Peiping, No. 8, 21 April 1960, page 49. /

Phthalic Anhydride Production in Thin-walled Condensers

In the production of phthalic anhydride, labor was used to hammer the sides of the thin-walled condensers with mallets in order to loosen the condensed product in the past. Such operations involved not only heavy labor chores, but the equipment also deteriorated quickly. The phthalic anhydride workshop of the No. 2 Factory, Peiping Chemical Industry, has installed a blower at the phthalic anhydride gas inlet of the condensers in the first row. The air current (room temperature) lowers the phthalic anhydride gas quickly below 130°C. The needle-formed phthalic anhydride formed does not adhere to the walls of the condensers, thus saving labor, and the installations are kept in good shape.

Direct Condensation of Formaldehyde and Coal Tar Oil Fraction Distilled at 170-230° C. in the Production of Mixed Phenolic Resins

The Peiping Experimental Chemical Factory has recently produced mixed phenol-formaldehyde resin by the direct condensation of formaldehyde and the oil fraction-distilled coal tar at 170-230°C. Since the starting material of such resins is readily available and requires only simple processing, the resin is used in case-casting. It not only lowers the cost of the finished product, but results of its application show that surface smoothness reaches Class four or five. It is also found that the trimming of the cast is not required, resulting in less waste and eliminating the need of such machinery.

Single-layered Adsorber Re-built as Double-layered Adsorber at Conversion Workshop of Kirin Fertilizer Factory

Under the leadership of the workshop Party Committee, sub-division workers at the conversion workshop of the Kirin Fertilizer Factory doubled their efforts and rebuilt the single-layered adsorber into a double-layered adsorber after working three days and nights. Production capacity has been

raised 4.4 times and the hydrogen sulfide obtained meets industrial needs.

Comparison between the single and double-layered adsorbers shows that the advantage of the latter lies in the fact that it affords a considerably lower resistance.

According to actual determinations, when gas volume reaches 20,000m^3/hr., its resistance is only 600 mm. (water), whereas before rebuilding, resistance reached 1,200 to 1,400 mm. (water) when gas volume is only 8,000 m^3/hr. Besides that, the gas passage capacity in withdrawing and regenerating has almost doubled after rebuilding. Consumption of the corresponding ammonium sulfide in regeneration has been reduced by half.

Paraldehyde Successfully Synthesized by Passing Acetaldehyde through Ion Exchange Resin

The Peiping Pharmaceutical Industry Research Design Institute recently succeeded in synthesizing paraldehyde by passing the acetaldehyde obtained by dehydrogenation of alcohol through ion exchange resin. It was then oxidized under atmospheric pressure and converted to acetic acid. This new method in production of acetic acid is safe in operation, continuous, and does not require high-pressure equipment and cooling units.

Anti-Corrosion Agent for Blower of Small-scale Sulfuric Acid Production (Contact Process) Made by Yu Hsing Chemical Factory Using Domestic Methods

An anti-corrosion agent was prepared by Yu Hsing Chemical Factory in Chinan by mixing augite, 1 kg., sodium silicofluoride, 0.05 kg., and soda ash liquor, 360 ml, (48 Be.). It was used to coat the blades of the blower used in small-scale contact process for producing sulfuric acid. After drying, the blades were further treated with sulfuric acid (40 Be.) twice. The blades thus treated showed good anti-corrosion properties and no serious corrosion developed after eight month's use.

Packing Changed to Save Steel

Hunan's Chao-yang Dyestuffs Factory has substituted iron drums with water-proof paper in the packing of sodium sulfide permanently. Packing cost per ton has now been reduced to seven yuan from 700 yuan originally.

The new packing method is very simple. After being heated to 170-180°C., the sodium sulfide is poured into drums which can be readily dismantled for cooling. After cooling for 48 hours and solidifying, the product is removed and tightly wrapped with water-proof paper immediately. Three layers of paper are normally used. Sodium sulfide kept in this manner retains its original state after storing more than 20 days.

Such packing is most suitable in supplying the needs of local small factories. Wooden cases are needed to protect the paper in long-distance transportation.

Saving Aluminum Sheets and Rubber by Changing Penicillin Packing

Generally both here and abroad, penicillin has been packed in glass bottles with rubber caps covered with aluminum. Such packing requires rubber and aluminum sheets and its quality is still unreliable. The Hou Ping Pharmaceutical Factory, through bold experiments, has changed its packing into sealed ampoules. The changeover will save two tons of rubber and aluminum sheets yearly. Meanwhile, the quality of penicillin is insured and the problem of leaking is solved. Its cost has also been reduced 40% to 50%.

10,095
10,158

- END -